Statewide Modeling Framework Needed For Bicycle and Pedestrian Trips, for the Sustainable Communities Strategy Process

Presented to the Strategic Growth Council
by the Safe Routes to School National Partnership
March 7, 2010

Contact: Deb Hubsmith, Director, deb@saferoutespartnership.org
Jessica Meaney, CA Policy Manager, jessica@saferoutespartnership.org

Summary
We greatly appreciate that the Strategic Growth Council provided grants to MPOs through Prop 84 to improve data collection and modeling for the development of Sustainable Communities Strategies (SCS), as required in SB375. We also greatly appreciate that the SGC specified that the transportation models must be sensitive to transit walking and bicycling. However, we are concerned that despite this requirement, MPOs may not have the political will or technical capabilities to develop models sensitive to walking and bicycling. In addition, since this is such a new field, there will not be consistency on the bicycle and pedestrian modeling throughout MPOs.

Since 12% of trips in California are already bicycle or pedestrian trips, and 40% of trips are two miles or less in length, there is ample potential to reduce and quantify greenhouse gas emissions through non-motorized modes. To maximize on this potential, and to create a consistent framework that can be customized by MPOs throughout the state, we urge the Strategic Growth Council to issue a contract to create a statewide bicycle/pedestrian modeling framework for the SCS process. This could be done relatively quickly and cheaply. Some of the leading firms that have been successfully developing these models are based here in California. The result would be better consistency in bicycle/pedestrian modeling and counting throughout the state, and an improved ability for local jurisdictions to conduct and quantify planning and smart growth benefits.

Introduction
Transportation Models are used to measure the impact of transportation investments, socio-economic changes and other variables in order to develop long-range transportation plans. The assumptions and analysis methods used in these models directly inform planning decisions. The term model refers to the mathematical equations that are performed to develop estimates and forecasts for how people will travel. Calibrated models are based on assumptions and are limited by the data available.

Model calibration and validation is a process, which the model output is tested against current or past data, the idea being that you diagnose and troubleshoot the model by checking its performance against current or past year data. An un-calibrated model does not undergo this vetting process and is thereby considered less valid by many.

Transportation models that are not sensitive to certain policies or programs can result in incorrect assumptions. This is especially the case for bicycle and pedestrian planning. Transportation plans that include bicycle and pedestrian investments will not show any impact in the conventional modeling procedure since the models typically do not include these trips.[1] Currently there exist biases in transportation models to overstate the benefits of roadway capacity expansion and understate the value of other modes of travel and travel management (bicycle, pedestrian, transit, pricing, incentives). [2]

There are a variety of technical and institutional barriers to improving transport models. Some improvements require more data or more advanced computer systems, which may have significant costs, although these costs can be minimized by identifying required changes early in the planning process, for example, before travel surveys are performed or new computer equipment purchased.

California is now charged with implementing the following in its transportation planning and processes:

- ✓ AB 32 - Establishes a statewide greenhouse gas emissions cap for 2020, based on 1990 emissions,
- ✓ SB 375 – Coordination of transportation and land use at the regional level for reduction in greenhouse gas emissions and vehicle miles traveled,
- ✓ SB 391 - State Transportation Plan developed by 12/31/2015 that identifies an integrated, multimodal system to achieve AB 32 targets,
- ✓ AB 1358 - Complete Streets - planning for all types of transportation in all plans and projects, and
- ✓ Caltrans Deputy Directive DD-64-R1 – Caltrans strategy for creating complete streets.

With these directives, it is imperative that California's transportation models accurately account for bicycle and pedestrian trips and have the ability to measure and forecast the impacts that transportation investments will have for improving walkability and bikablity oftransportation system and how this affects travel patterns.

Overview of Current Practices
4 Step Model and Travel Demand Forecasting
For the past 40 years, transportation planners have used a four-step transportation demand model. The goal of the four-step model is to predict demand for transportation services over

[1] A transportation Modeling Primer by Edward A. Beimborn. Center for Urban Transportation Studies, University of Wisconsin-Milwaukee. May 1995, updated 2006.
[2] Reid Ewing, Keith Bartholomew, Steve Winkelman, Jerry Walters and Don Chen (2007), Growing Cooler: The Evidence on Urban Development and Climate Change, Urban Land Institute and Smart Growth America (www.smartgrowthamerica.org/gcindex.html).

time using factors such as land use, population forecasts and existing and planned transportation investments.

1. Trip generation. Predict total trips that start and end in a particular area (called Traffic Analysis Zones or TAZs), based on factors such as each zone's land use patterns, number of residents and jobs, demographics, transportation system features (number of roads, quality of transit service, etc.), and distance between two zones.

2. Trip distribution. Trips are distributed between pairs of zones, based on the distance between those zones.

3. Mode split. Trips are allocated among the available travel modes (usually auto and transit).

4. Route assignment. Trips are assigned to specific facilities included in the highway and transit transportation networks.

The Southern California Association of Governments (SCAG), the largest MPO in California and the country, followed the standard four-step model to complete its most recent RTP adopted in May 2008. It was calibrated and validated using the Year 2000 Post Census Regional Travel Survey and the Year 2000 Census data. Interestingly enough, on page 21 of this report, non-motorized travel is found to represent 11.9% of all trips in the SCAG region. This high percentage of trips should be included in the calibrated model as it represents a significant portion of the travel patterns in the region, but yet it is not.

Activity Based Models

Activity Based models are now being developed for MPO's. These models are seen as having significant benefit over the four-step model as they will be able to stimulate the complex interactions of proposed changes in land use, economics and transportation systems at a finer level. These types of new models are currently under development at the four largest MPO's in California: SACCOG, MTC, SCAG and SANDAG. These MPO's, along with the State of California have all decided to use PECAS (Production, Exchanged, and Consumption Allocation System) as their activity based model platform. It is anticipated that the activity-based model will be used in the development of the Regional Transportation Plans (RTP's) and Sustainable Community Strategies (SCS) as the MPO's implement SB 375. A key part of the SCS's will be to quantify the reduction in greenhouse gas emissions; this will be done through a model analysis.

MPO's

In May 2008, the California Transportation Commission (CTC) adopted an addendum to the RTP guidelines that stated the RTP should address climate change and greenhouse gas (GHG) emissions. The guidelines recommended the largest state MPO's create new activity based models and micro economic land use models. In order to accomplish this, MPO's are working to improve their models to address this need, but how well they will accurately and appropriately incorporate bicycling and pedestrian trips is still unclear, and many staff at the MPO level seem unable to explain how these trips will be accurately counted and forecasted. This is understandable as it is a new element to transportation modeling, which has historically focused solely on vehicle trips. But the need exists for transparency and accountability on how these trips will be incorporated -- not just to modeling technicians but to all interested stakeholders.

In September 2009 SCAG applied to the Strategic Growth Council for $2M to make the following improvements:

- Trip-Based Regional Model Improvement
- Local Sustainability Model
- Activity Based Model
- PECAS Land Use Model
- Year 2010 Travel Survey
- Data Systems
- Air Quality Modeling Enhancement
- Regional Heavy Duty Model
- Weekend Model

How this funding will address the lack of accounting for bicycle and pedestrian trips is still unclear, especially in light of the fact that the SCAG region lacks empirical data, with its only data concerning bicycle and pedestrian trips being the Year 2000 Post Census Regional Travel Survey. This is extremely concerning, especially as bicycle and pedestrian travel are identified as part of a key solution to meet our greenhouse gas reduction strategies.

State of California
The Department of Transportation (Caltrans) is in the process of developing a statewide framework and model for the analysis to better understand the interactions between land use and transportation investments, especially those related to greenhouse gas emissions, in order to comply with SB 391. Part of this involves the Statewide Household Travel Survey. When asked at a recent workshop in Los Angeles how bicycle and pedestrian trips would factor into the model, the answer was that the regional planning agencies are accounting for those trips. Yet, how the MPO's are planning to do that still seems unclear, even when questions are raised. This presents the continued problem for the lack of adequate planning and research for bicycle and pedestrian trips. In California 40% of trips are two miles or less in length and bicycles and pedestrian account for approximately 12% of trips. There is significant potential to increase the bicycle and pedestrian mode shares as more facilities are constructed to create bicycle and pedestrian networks.

Existing Best Practices
Over ten years ago, the FHWA recognized the need to model for bicycle and pedestrian travel, with their publication, The Guidebook on Methods to Estimate Non-Motorized Travel (U.S. Department of Transportation, Federal Highway Administration, Publication N. FHWA-RD-165, July 1999). It stated, "Further development of modeling techniques and data sources are needed to better integrate bicycle and pedestrian travel into mainstream transportation models and planning activities (Vol. 1, Section 4)."

This same report cited the lack of empirical data and calibration as the basis for their formulas. Alta Planning + Design, a well-recognized planning consultant firm, specializes in bicycle and pedestrian planning. Alta has been using estimates of bicycling and walking in all of its plans around the country since 1990, using a combination of counts, surveys, U.S. Census and NHTS data, with the output of GHG impacts being used by air quality management districts and CARB as part of their grant evaluation.

As a result for the need for greater accuracy, Alta formed the National Bicycle & Pedestrian Documentation (NBPD) Project with the Institute of Transportation Engineers (ITE) in 2004 to encourage agencies to collect count and survey data in a consistent manner, and to send their data into a centralized source that also includes background data like land use. Since that time, Alta has collected bicycle and pedestrian count data from over 300 cities and counties in the U.S. and Canada, and developed the most comprehensive data set available in the world. The

templates and methodologies for counting exist -- what is needed is standardization and prioritization of their data collection and use in modeling throughout the State of California.

In 2006 Alta was awarded the Seamless Travel Study contract by Caltrans, which used the NBPD methodology in a focused area (San Diego County) and included automatic counting of bicycles/pedestrians, manual counts/surveys at 8-locations, and the most extensive non-motorized transportation model development ever undertaken in the country. The research, published in 2010, includes a GIS-based bicycle and pedestrian model and a formula using a combination of land use, demographics, and other factors, which has proven effective at estimating existing/future bicycling and walking at any location and in any area.

This model is being used by local agencies as part of their Climate Action Plans to estimate impacts on GHG related to changes in land use, network development, demographics, and other factors, and can be integrated with existing traffic models. Alta Planning's models are also being used by FHWA (Volpe NTSC) as part of the evaluation methodology to assess the impacts of the $100 million Non-motorized Transportation Pilot Project in four cities/counties around the country.

Creating Standard Bicycle/Pedestrian Modeling for California

With much of the modeling already in place, tested, and in use, it would take only a moderate effort to convert this into a tool that can be used in California by MPO's (for them to customize as needed) in creating RTP's and Sustainable Communities Strategies. The biggest efforts would be to understand (1) regional variations in activity due to weather and topography, and (2) the types of regional transportation models in use and how the Seamless Model would need to be customized to fit the model assumptions, inputs, and outputs. As an example, future bicycling/walking is somewhat dependent on the extent and quality of the network and infrastructure; however, regional models currently may not have data on these systems. The Seamless Model output would also provide very specific information to local agencies on the type of land use and transportation policies that would be the most effective in increasing walking/bicycling.

The Seamless Model conclusively proved that certain demographic and land use combinations produce higher walk/bike rates. Since the Seamless Model is GIS-based, it would allow local agencies to compare existing land use conditions with potential re-zoning for transit oriented development (TODs) and other developments so that they can draft new zoning and land use policies for specific areas.

The Seamless Travel Model has already been accepted by Caltrans, FHWA, State DOTs, and local agencies, is in use to quantify GHG and as part of Climate Action Plans, and can be fully integrated into existing transportation models. Most importantly, it has the statistical back-up that is comparable to the back-up for the other modes, and support among local and state agencies.

Recommendations

In this moment of evolving transportation modeling methodologies and approaches, it is critically important for the state of California to lay the groundwork for proper data collection and modeling at the MPO level. This should be done through allocating Prop 84 funds for a statewide contract that will develop a consistent bicycle/pedestrian model and methodology that can be customized by the MPOs.

At the present time, it is also critical that transparency and openness exist in model

development and output. We recommend that the SGC consult with experts such as Alta Planning + Design, ITE, and the FHWA who are currently using these emerging methodologies. Transportation modeling is a highly technical area, involving a high level of expertise, however there must be a way that a broad understanding of the data being used and the assumptions being made can be shared with policy makers and interested stakeholders. By creating a statewide framework, it will be more possible for MPOs to exhibit this transparency.

Is it critical that state leadership continue to support the incorporation of bicycle and pedestrian trips into standard transportation models. As part of this, we urge the state to ensure that proper data collection takes place in the upcoming household travel survey. The state should also ensure that the survey is comprehensive in capturing all travel activity, including non-motorized travel, short trips, travel by children, and off-peak travel, as this data will inform the models for years to come.

Models are only as good as the data that are put in them. The historical lack of empirical data on walking and bicycling has hindered planners and policy makers' ability to make informed decisions on the impact of investments. We urge the state to ask the MPO's to work with their local jurisdictions to begin incorporating bicycle and pedestrian counts into traditional transportation planning efforts. Some MPO's in different parts of the country are already doing this.

There is huge potential for walking and bicycling to help the state of California achieve AB32 and SB375 goals. The Safe Routes to School National Partnership looks forward to working with the Strategic Growth Council, CARB, MPOs and other stakeholders on this process.

We would be happy to answer questions about our modeling proposal. We look forward to working with you more.